

Use of GOLD Guidelines for COPD Patients in an Out-patient Pulmonary Practice: Implications
for a Future Practice Change

DNP Final Project

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Dedication

I would like to dedicate my project to my family. My husband, Michael helped to start me on this journey and supported me throughout these past three years, “you are my rock”. I would not have made it without his love and constant support. I would also like to thank my daughter, Alyssa for always encouraging and supporting me during this journey. Finally, my sister Tammy for always remaining my confidant and as a fellow professional nurse understands the grueling yet very rewarding aspects of our careers.

To my daughter Amanda, I love and miss you...

Abstract

Background: Chronic Obstructive Pulmonary Disease (COPD) is a treatable disease and exacerbations from COPD are preventable, but can require hospitalizations, that cause poor outcomes for these patients. The continued increasing costs and burdens of COPD on the current health care system are rising significantly; even though there are proven Evidence Based Practices (EBP) Global Initiatives for Chronic Obstructive Lung Disease (GOLD) guidelines that have been shown to consistently improve COPD patient outcomes and prevent exacerbations.

Purpose: The purpose of this DNP quality improvement project was to evaluate the use of the adoption of Global Obstructive Lung Disease Initiative (GOLD) recommendations in an out-patient pulmonary practice (Gold Guidelines (2016 Global Initiative for Chronic Obstructive Lung Disease, 2015).

Project Methods: An EBP-QI approach was used. A three year retrospective review of 120 COPD patients' electronic health records (EHRs) provided the source of the quality process data.

Results: The records accessed reported an age range of 40 to 89 with mean of 64.83 years. COPD severity included Stage II, n=70 (58.3%), Stage III, n=40 (33.3%), and Stage IV, n=10 (8.3%). The accessed records were closely divided by gender with 61 females (50.8%) and 59 males (49.2%). More than 90% of the sample was Caucasian with African-Americans making up 6.7% of the records. Smoking status was documented for all records with 61.9% of the patients as former smokers and 38.1% current smokers. All patients had smoking cessation options offered to them.

GOLD recommendations for recommended pharmacological therapy were assessed, and revealed that short acting bronchodilators (SABA) were provided to 100% of patients, while long-acting anticholinergic bronchodilators (LAMA) were provided to 93.3% of patients. For

those who didn't received this therapy, rationale was provided in the record. The use of an inhaled corticosteroid/long acting beta agonist (ICS/LABA) or separate prescriptions of just the ICS or the LABA was provided to 92.5% of patients.

Pneumococcal vaccines were noted in only 55.1% of patients while influenza vaccines were administered to 63.9% of patients. It is possible that vaccinations were not given to the remainder due to previous administration and up to date status. Pulmonary rehabilitation was found to only be prescribed in 36.7% of the records.

The outpatient pulmonary practice providers were able to meet overall GOLD treatment recommendations discussed within this project 80% of the time. Of the 120 patient records abstracted, 24 (20%) received all of the treatment recommendations.

Conclusions and Implications: While smoking cessation and medication prescription were closely aligned with the recommendations, determination of vaccine use was limited by lack of information regarding patients' vaccination status being current or outdated. The guideline recommendation with the lowest compliance was the referral to pulmonary rehabilitation (PR). This may be related to younger or less severely ill patients, or the structural limitations of PR such as geographical distance to program, cost (related to high co-pays), or access to programs during off-peak hours.

Chapter One: Introduction

Significance of the Problem

Chronic Obstructive Pulmonary Disease (COPD) is currently the fourth leading cause of death world-wide, yet COPD is both preventable and treatable. The Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines provide “best practices” for evaluation, diagnosis, and treatment of the disease (2016 Global Initiative for Chronic Obstructive Lung Disease, Inc. [GOLD Guidelines], 2015). High costs and reimbursement penalties that are due to re-hospitalization of acute exacerbation of chronic obstructive pulmonary disease (AECOPD) exacerbations can be significantly decreased by utilizing the GOLD guidelines.

This Doctor of Nursing Practice (DNP) evidence-based quality improvement (EBQI) project collected three years of retrospective data from an out-patient pulmonary practice site to evaluate the use of GOLD guidelines from existing COPD patient records. This EBQI project’s analysis and synthesis of those findings was to determine the utilization of GOLD guidelines in this patient population. Outcome data identified gaps and subsequent underutilization of “best practices.” These findings served as a basis to implement a future EBQI practice change.

The problem of GOLD guidelines underutilization is compelling because COPD affects approximately 14% of the adult population in the United States (U.S.) between the ages 40-79. According to the GOLD guidelines, COPD is now the fourth leading cause of preventable and premature death in the world (2016 Global Initiative for Chronic Obstructive Lung Disease, Inc. [GOLD Guidelines], 2015). By the year 2020, COPD is expected to be the third leading cause of death in the U.S. (Lemmens et al., 2013). Use of GOLD guidelines improves patient outcomes, by decreasing COPD patient’s acute exacerbations of COPD (AECOPD), which increase mortality and worsen air flow limitations (GOLD, 2015). Also, a decrease in COPD patients’

hyperinflation, while improving exercise ability and overall health, has been documented and established, by utilizing EBP with the Level I Gold guidelines (GOLD, 2015).

The depth of the problem is illuminated by annual emergency room visits for AECOPD within the U.S. that currently attain 1.5 million and hospitalizations that reach 725,000, at a cost of up to \$60 billion (Feemster & Au, 2015). Up to 40% of patients hospitalized for AECOPD do not receive recommended treatment(s) while in-patient or do not receive needed follow up treatment at discharge; with half receiving inappropriate treatment (Feemster & Au, 2015).

Nearly 23% of 725,000 patients who are hospitalized and discharged with AECOPD exacerbations are readmitted within 30 days after discharge (Feemster & Au, 2015). Reducing these AECOPD readmissions without early and appropriate out-patient follow up care is unlikely (Feemster & Au, 2015). As of 2015, U.S. Centers for Medicare and Medicaid Services (CMS) policy makers began to penalize both providers and hospital systems for lack of utilization of resources and provision of quality care (Feemster & Au, 2015).

Purpose

The purpose of this project was to identify gaps in use of out-patient GOLD guidelines treatment recommendations, as well as identifying whether a future evidence based quality improvement (EBQI) practice change is needed, in order to prevent AECOPD that impacts quality of life and survival rates. The outcomes of this DNP EBQI project will imply whether there needs to be improved utilization of GOLD guidelines that will improve quality of life and longevity of COPD patients, while decreasing health care costs for systems, patients, and their families.

PICOT Question

The focus of this project and literature search is supported by the following clinical PICOT question and problem identification: Among COPD patients with exacerbations requiring hospitalizations (**P**), does implementation of a care bundle consisting of GOLD guidelines criteria (**I**), impact exacerbation which requires hospitalization (**C**) within the first 30-60 days after discharge (**T**)?

Significance to Nursing and Health Care

The continued increasing costs and burdens of COPD on the current health care system can often be prevented by utilizing Evidence Based Practice (EBP) COPD GOLD guidelines (2016 Global Initiative for Chronic Obstructive Lung Disease, 2015).

Chronic obstructive pulmonary disease is a progressive disease that is preventable, treatable and causes premature deaths world-wide. Most COPD patients are diagnosed at moderate to severe stages of their disease. Interventions focus on symptom management and improvement in function and quality of life while also reducing morbidity. However, due to the chronicity of COPD, the disease is lifelong and mortality is the unfortunate ultimate consequence. COPD has a direct relationship between soaring costs and severity of disease due to AECOPD and home oxygen use (2016 Global Initiative for Chronic Obstructive Lung Disease, 2015). This is related to the requirement of home oxygen for patients who are hypoxemic as the primary intervention to reduce mortality while the severity of the disease leads to increasing need for hospitalization.

Previous studies have identified mortality and lung function as markers for outcomes for COPD patients. A recent meta-analysis by (Feemster & Au, 2015) identifies decreasing quality of life after AECOPD to be associated with more rapid decline and mortality for the COPD

patient population. Newer studies have addressed poor quality of care and the need to increase interventions to prevent hospital readmissions by introducing maintenance therapy treatments for AECOPD (Feemster & Au, 2015).

Consistency with DNP Essentials

This DNP student's proposed EBQI project fulfills several criteria that will meet the DNP Essentials model for advanced practice nursing. Three key essentials will be utilized for the completion of this project (Zaccagnini & Waud White, 2014).

DNP Essential II: Organizational and Systems Leadership for Quality Improvement and Systems Thinking will be applied. The APRN DNP student's ability to recognize strategies that will create quality improvement by identifying potential problems within the practice, will guide future practice changes to improve outcomes for COPD patients and the practice.

DNP Essential III: Clinical Scholarship and Analytical Methods for Evidence-Based Practice is congruent with this DNP project. This DNP student's internal evidence, as a practicing APRN with the COPD population for the past 13 years, identified the strongest evidence for the treatment of COPD as Level I meta-analysis, and will evaluate if clinical practice guidelines are being utilized within the out-patient specialty practice. The outcome of this EBQI project will provide information that will help to improve the practice's use of EBP for COPD patients.

DNP Essential IV: Information Systems/Technology and Patient Care Technology for the Improvement and Transformation of Health Care informed this project in determining appropriate outcomes for EBQI project that will lead to potential decisions of practice change.

Project Objectives

This project's objectives were to COPD patient records for each variable of the GOLD guideline treatment recommendations. Each variable and outcome was measured to guide the decision for a future practice change. Initially all COPD patients within the practice were identified by an ICD-9 code, 496. To avoid confusion for this project's data collection, the recent varying levels of ICD-10 codes for COPD, which were implemented in October, 2015, were not queried for this project. A query was sought for a group of 120 moderate to severe COPD (GOLD II-IV) patients; which were identified as the convenience sample. Demographics including age ranges, sex, ethnicity, and payer source of the study group, were compared to the entire population of the out-patient practice's COPD patient population for appropriate representation.

Once an appropriate representative group of patients were identified, an individual retrospective chart review was able to identify GOLD II-IV disease level, based on objective findings of each patient's FEV1 percentage (<80) with an FEV1/FVC ratio (<70). Each pharmacologic and non-pharmacologic GOLD guideline treatment recommendation for this group of patients was evaluated, as well as the identification of gaps/underutilization of GOLD guidelines in their treatment history. This project identified measurable success of the GOLD guidelines best practices along with possible gaps and/or underutilization in "best practice" treatment plans. The underuse of best practices that may be a contributing factor to AECOPD and decrease quality of life, and longevity.

The Iowa Model of Evidence Based Practice

The appropriate framework for this project incorporated the initial guidance of the IOWA Model of Evidence Based Practice to Promote Quality Care (Appendix A) framework (Melnik

& Fineholt-Overholt, 2011, figure 11.3; Titler et al., 2001). The IOWA Model was chosen due to its origin as a practice theory and its relatability to EBP in specific the patient population (Moran, Burson, & Conrad, 2014).

The initial phase of the Iowa Model provides guidance on asking a “problem focused” question for process improvement that needed to be asked, for use of GOLD guidelines for the COPD population at the out-patient pulmonary practice. The model guided this DNP student/clinician on whether this is a priority for the organization, which is a “yes”, because it is one of the primary diagnoses’ seen in the out-patient pulmonary practice. The next step of the model’s algorithm then guides the clinician to form a team (Melnik & Fineholt-Overholt, 2011, figure 11.3; Titler, et al., 2001). This was then completed by getting stakeholder and clinician support and approval from the pulmonologist/practice owner, as well as the practice manager, who is also the EHR AtheanaNet manager. Next, as directed by the Iowa Model, Level I EBP guidelines, as well as an extensive literature review, were gathered and evaluated for relevancy.

A critique of data collection of 120 patient’s findings of demographics, COPD disease severity, with GOLD guidelines treatment(s) received, were synthesized for a sufficient analysis for appropriate decision making for a practice change implementation. Should there be sufficient evidence obtained in the findings, the model then provides guidance to move forth with a practice change.

Health Change Trajectory Model

Due to the complexity and levels of COPD severity and illness outcomes to be discussed, an innovative Health Change Trajectory model (Appendix B) was chosen for this DNP project. A Health Change Trajectory model integrates Mishel’s “Uncertainty in Illness” theory and the

Corbin and Strauss "Chronic Illness Trajectory" framework that is applicable to levels of disease and has practice and global implications for use in chronic disease (Christensen, 2015).

Chapter 2: Review of Literature

Global Obstructive Lung Disease Initiative Guidelines/Best Practices

Providing the evidence-based GOLD guideline care (GOLD, 2015) in the out-patient setting entails prescribing inhaled corticosteroids (ICSs), long acting bronchodilators (LABAs), referral for pulmonary rehabilitation, prescribing prevention vaccinations for influenza and pneumonia, along with continued smoking cessation, and early symptom clinical follow up. The guidelines include the following specific recommendations:

1. Pulmonary rehabilitation referral/physical activity orders for patients with GOLD classification of II-IV, based on post bronchodilator FEV1.
2. Appropriate medication orders for disease and symptom severity in the form of:
 - a.) Short acting bronchodilator (SABA)
 - b.) Long acting bronchodilator (LABA)
 - c.) Inhaled corticosteroid (ICS)
 - d.) ICS combined with a LABA (ICS/LABA)
 - e.) Anti-cholinergic meter dosed inhaler (LAMA) or in combination with a long acting bronchodilator (LAMA/LABA)
3. Vaccination(s) consisting of influenza and/or pneumococcal, with recommended updates or prescription(s) and counseling to obtain these vaccinations.
4. Smoking cessation education, counseling, and treatment, with current diagnosis of Chronic Tobacco Dependence, at each visit.

The improvement of chronic care management (CCM) of COPD disease within the out-patient care setting has shown to improve quality of life and decreased AECOPD (Lemmens et al., 2013, p. 734). Providing and/or improving utilization of GOLD guideline treatment with

each guideline every time with every COPD patient would be insured by the use of an out-patient COPD Care Bundle (CB).

Care Bundles are identified by the Institute for Health Care Improvement (IHI) to “deliver the best possible care for patients” with three to five Level I Evidence Based Practices (EBP) that are followed together as a group for any patient every time. These (CBs) that include EBPs, are performed consistently, every time, and are shown to improve patient care and outcomes (Haraden, 2014, p. 1).

A recent hospital discharge CB for COPD patients was developed in order to improve outcomes for COPD patients after an exacerbation. The teams that were formed for implementation of the CB found barriers to their success to be “staff too busy, staff shortages, lack of staff engagement, added workload of the bundle, and patient coding issues” (Lennox et al., 2014, p. 1). The COPD discharge CB components which included five EBP elements which included smoking cessation assistance, referral to pulmonary rehabilitation, providing written education for COPD self-management, implementation of satisfactory use of inhalers, and making a follow up referral and appointment to pulmonary specialty prior to discharging the patient. These EBPs as CB components are outlined within the GOLD guidelines as effective management of COPD (GOLD, 2015).

The Institutes of Medicine (IOM) recently identified six dimensions of care that need to be improved to achieve the ideal healthcare system. These dimensions include improvement of patient safety, effective treatment for patients, patient centered care, along with timely, efficient, and equitable care ("IOM's Six Aims," n.d.). If the GOLD guidelines are not provided by initiating and completing a set of known CB practices each and every time a COPD patient is seen, there is no consistency and these dimensions of care are not adequately provided. The

COPD patient would have lack of safety and prevention from re-exacerbation of their disease, lack of effective treatment that is centered on each patient, their EBP care would not be implemented in a timely manner, and the out-patient office would not be able to provide a timely and efficient treatment plan. Equitable care would be negatively affected because of inconsistency of care and failure to provide the COPD CB.

Review of Literature

An exhaustive search for literature was completed for the above mentioned PICOT question. The COPD GOLD guidelines that were utilized for the audit questions are written by experts in the field and have been updated as of December 2015 (2016 Global Initiative for Chronic Obstructive Lung Disease, Inc. [GOLD], 2015). The GOLD guidelines are a summary of the latest world-wide EBP recommendations for COPD. They include the latest meta-analyses of randomized control trials (RCT) and therefore are the best Level I EBP available (2016 Global Initiative for Chronic Obstructive Lung Disease, 2015).

The GOLD guidelines provide the presentation of symptoms for a COPD diagnosis. The diagnosis should be considered when a patient presents with chronic cough, complaints of shortness of breath (dyspnea), or is producing sputum with his cough. Any patient with a history of smoking and/or exposures (cooking/heating fuels and/or occupational chemicals/dusts), is considered at risk for COPD and should have a spirometry test completed. A spirometry test that indicates obstruction of the airways (air flow limitation ratio of an $FEV_1/FVC < 0.70$) must be obtained. This spirometry value along with the above mentioned risk factors will verify a clinical diagnosis of COPD (GOLD, 2015).

Symptoms experienced by COPD patients can be mild to severe in nature. However, dyspnea, (a “cardinal” symptom), chronic cough, sputum production, with possible wheezing

and feeling a tightness in the chest area are characteristic symptoms of the disease” (GOLD, 2015). When spirometry test results show air flow limitations that reach severe to very severe stages (GOLD III and IV) with a ratio of $FEV_1/FEVC < 0.50$, additional symptoms of cough syncope, fatigue, and or weight loss can occur. An AECOPD is caused by worsening air flows and happens acutely. Having two or more events of AECOPD within one year are considered frequent occurrences, which also predict worsening disease and increased risk of death (GOLD, 2015).

The best available evidence to guide a clinical question is based on the level of evidences’ quality, with the strongest evidence labeled as Level I and the weakest evidence as Level VII (Facchiano & Hoffman Snyder, 2012). Multiple on-line databases that were included in the search were Cochrane, Pub Med, CINAHL, EBSCOHost Medline, and Up To Date. The systematic review utilized the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) checklist to appraise the literature (Moher, Liberati, Tetzlaff, & Altman, 2009). Outside sources from the 2013-2016 GOLD Guidelines and UpToDate.com were queried for the same PICOT vocabulary, revealing multiple hyperlinks within one source to treat COPD, reflecting multiple consistent recommendations. Due to the abundance of studies, best practices identified during a Rapid Critical Appraisal (RCA) exercise revealed the need to use Level I studies with meta-analysis Cochrane library support. This decision eliminated the need to review multiple articles that may not have produced desired outcomes utilizing the GOLD guideline criteria (GOLD, 2015).

This clinical practice DNP project was guided by the highest EBP available. Level I evidence was synthesized and evaluated in the form of tables. The literature provided meta-

analyses of evidenced based clinical practice guidelines developed from randomized controlled trials (RCTs) and systematic reviews.

Level I evidence that included relevant to this DNP project was considered along with the evidence of the GOLD guidelines. A Cochrane systematic review (2013) by Kruis and colleagues included 26 RCTs consisting of 2997 COPD patients from 11 countries. The authors analyzed patients with COPD who did, and who did not receive integrated disease management. The meta-analysis revealed that integrated disease management (IDM) between providers decreased hospital admissions, and hospital days per person (Kruis, et al., 2013). In 2013, Lemmons and colleagues reported a U.S. meta-analysis electronic data base search from 1995 to 2009 which included nearly 30 studies with the majority of studies being RCT's, for COPD Chronic Care Management (CCM). They reported that CCM of the COPD patient population improved quality of life (QoL), exercise capacity, and decreased hospitalizations for AECOPD (Lemmons, et al., 2013).

Evaluation of the above literature highly suggests that integrated and out-patient management improves the COPD patient population's quality of life, exercise capacity, and prevents hospitalizations for AECOPD, which decreases risk of death. Therefore, this project is important to document the impact of GOLD guidelines on an out-patient COPD population to prevent hospitalizations for AECOPD. The GOLD guidelines provided the best EBP for CPG for COPD and AECOPD.

Gaps in evidence existed regarding CCM to decrease hospitalizations without providing quality COPD education (Fan et al., 2012). The RCT study reported 960 adult Veteran Administration COPD patients that were entered into a CCM program with nurse educators to decrease hospitalizations. The study was discontinued by the data safety monitoring board after

2 years due to an increase in mortality compared with the non-study group (Fan et al., 2012). A Cochrane systematic review by Walter and colleagues (2010) analyzed individualized Action Plans focused on oral steroid and antibiotic use for recent AECOPD patients. The review found increased use and dosage of oral steroid and antibiotics. As this review focused on AECOPD patients, it did not inform data selection and collection for this project which focused on the general COPD patient.

Related research

One small study was reviewed regarding an out-patient QI project on patient and provider attributes associated with AECOPD. The investigators examined 50 electronic health records (EHR's) and found that CPGs were only documented in 24% of the EHRs, but when CPGs were followed there were less AECOPD episodes (Stanley, Gordon, & Pilon, 2013). Evidence did not identify provider differences between out-patient APRNs and physicians, regarding the use of GOLD guidelines and AECOPD incidents. Recent interests in treating AECOPD in the home setting versus the hospital has been developed in randomized studies but has not revealed consistent results (Chojnowski, 2003). A QI project retrospective evaluation of four hospitals and a total of 1,052 AECOPD patient records found several challenges of initiating a Level I evidence care bundle (CB) that included GOLD guidelines (Lennox, Green, Howe, Musgrave, & Bell, 2014). These challenges were organized along 5 themes: staffing, infrastructure, process, use of improvement methodology and patient and public involvement. The authors concluded that these challenges can be identified and addressed prior to implementation of changes in care processes.

Summary

The GOLD guidelines provide evidence-based recommendations for the diagnosis, treatment and management of COPD. Diagnosis includes use of spirometry to elucidate disease severity by stage (Stages I through IV). Treatment focuses on 4 components: tobacco cessation, pharmacological interventions based on stage, vaccinations for pneumonia and influenza to prevent these significant morbidities, and, referral to pulmonary rehabilitation (GOLD, 2015). Together, these recommendations can be “bundled” to provide evidence-based care in a consistent manner (Haraden, 2014). The use of the project PICOT question drove the search for external evidence. Several meta-analyses (level I evidence) support the use of the interventions identified in the GOLD guidelines (Kruis, et al., 2013; Lemmons, et al., 2013). Additional literature found (Fan, et al., 2012; Stanley, et al., 2013; Lennox et al., 2014) described issues and themes that can impact implementation of practice change. These environmental and process related issues and themes should be addressed prior to practice changes are implemented.

Chapter 3: Methods

Project Design

The design for this DNP project utilized an EBQI approach. When seeking to improve outcomes using EBP within practice, the process is considered to be EBQI (Melnik & Fineholt-Overholt, 2011). The definition of EBP is best explained by using a “life-long learning approach to clinical decision-making that involves the conscientious use of the best available evidence (including a systematic search or and critical appraisal of the most relevant evidence to answer a clinical question) with one’s own clinical expertise and patient values and preferences to improve outcomes for individuals, groups, communities, and systems” (Melnik & Fineholt-Overholt, 2011, p. 575).

Clinical expertise of this DNP student has been developed by practicing for the past 13 years as an Advanced Practice Registered Nurse (APRN) as a Board Certified Family Nurse Practitioner (BC-FNP) in the out-patient system setting. This DNP student’s clinical concentration and specific interests are with the COPD patient population. As a provider who has seen hundreds of new consult AECOPD patients in an out-patient setting, internal evidence suggests that COPD is immediately treatable and AECOPD hospitalizations are preventable in the out-patient setting, when Level I EBP GOLD guidelines treatments are implemented.

Sample

The sample for this DNP Project consisted of a subset of 120 patients, as a convenience sample of the practice’s COPD patient population accessibility and the short time frame to complete the project (Stommel & Wills, 2004). The inclusion criteria were patients with a diagnosis of COPD and ICD-9 code of 496, were between the ages of 40 and 89. GOLD classifications II, III, and IV, which were included in the retrospective EHR chart review and all

GOLD classification I patients ($FEV_1 > 80\%$), were excluded upon initial query. The EHR utilized was the AtheanaNet system at the DNP student's out-patient pulmonary specialty practice from an ICD-9 code 496 diagnosis list of over 1200 patients, upon initial query. A unique patient identifier number between 1 and 120 was assigned to each COPD patient audited. The use of the unique identifier was used to avoid access to and reporting of personal information from the electronic health record.

Methods

This DNP student's EBQI Project attained a QI "Exempt" designation from this midwestern academic university's IRB. Both the pulmonologist/practice owner and the office manager (Atheana Manager) provided written permission to allow the employed APRN/BC-FNP and this DNP student to collect data for this EBQI project. The project location was in an outpatient pulmonary specialty practice located in southwestern Ohio.

Personal health information (PHI) was accessed to only identify the COPD disease population convenience group. No PHI was collected or recorded as part of this DNP project. A unique patient identifier number (1-120) was assigned to each patient to protect their identities and to separate and remove PHI from the EHR data collection process. The DNP student's out-patient practice's practice manager acted as the "honest broker" and liaison for the AtheanaNet EHR system. The AtheanaNet EHR system was purchased by the pulmonary practice three years prior to the data collection and the COPD GOLD Guideline treatment components queried, if followed, were already documented within different aspects of each patient's office visit.

A convenience sample of 120 COPD patients with either GOLD class II, III, and/or IV disease severity was obtained via retrospective chart auditing. Each patient record that met

criteria for inclusion was assigned a unique patient identifier. The level of disease severity was obtained by reviewing each sample patient's most recent post-bronchodilator spirometry.

PFT GOLD Classification (Based on Post-Bronchodilator FEV1)

In Patients with FEV1/FVC <70%

- GOLD I: Mild COPD $FEV1 > 80\%$ predicted
- GOLD II: Moderate COPD $50\% \leq FEV1 \leq 80\%$ predicted (start of qualification for pulmonary rehabilitation).
- GOLD III: Severe COPD $FEV1 < 50\%$ predicted
- GOLD IV: Very Severe COPD $FEV1 < 30\%$ predicted

The above GOLD criteria, was then queried through each patient's office visit(s) by the DNP student who is an APRN who has specialized in treating COPD since 2003. The COPD GOLD guidelines audit was strictly managed by only this DNP student by reviewing the progress notes in the EHR. The COPD ICD-9 diagnosis code 496 was entered into the AthenaNet EHR data base to query a three year period of October 1st, 2012, through September 30th, 2015. The diagnosis of COPD is made during the initial out-patient pulmonary patient consult and spirometry testing.

Data Collection Instrument

A single spreadsheet was created and utilized for data collection. This was derived by the DNP student for extracting data regarding the GOLD Guideline treatment recommendations. Demographic variables included gender, ethnicity, and payer source. Documentation of implementation of the GOLD guideline treatment recommendations was then assessed for each unique patient number and documented on the spreadsheet. (Table 1).

Table 1: Audit Tracking Sheet (ATS)

Pt #	Gold Stage II-IV	Sex	Age	Ethnicity	Smoker/Ex-Smoker/Addressed	ICS/LABA	ICS	LABA	P Vacc	Flu Vacc	Pulm Rehab
1											
2											
3											
4											
5											
...											
120											

Data analysis

An EHR audit of pulmonary function testing was completed to classify patients' COPD stages of I to IV. Data consisting of the COPD GOLD guideline treatment recommendations were evaluated by query of total patients who had all, part, or none of the components implemented in their previous treatment plans. The descriptive data findings will be utilized for a future quality improvement Practice Change project within the pulmonary practice.

Chapter 4: Findings

Results

This DNP EBP QI project utilized retrospective patient data from AtheanaNet EHRs within the out-patient pulmonary practice for the previous three years leading up to the start of planned data collection. The data collected by the DNP Student was for the purposes of evaluating use of the GOLD guidelines in 120 COPD practice patients with GOLD II-IV disease from October 1st, 2012 to October 1st, 2015. A three year data collection limitation was chosen, to eliminate the need to review data from paper charts, which were utilized prior to the start of the pulmonary practice's initiation and use of AtheanaNet system for EHRs.

The convenience sampling was attained from a three year query sample of greater than 1200 COPD patients. In order to provide a practical and obtainable goal for the project time frame, the convenience sample of 120 patients was recommended by the DNP student's advisory committee members and internal expertise. The patients were listed by age and therefore, every 15th to 20th patient's data was highlighted for inclusion in the convenience sample. Many patients were originally excluded from the sample because they were found to have a missing original Pulmonary Function Testing (PFT) for FEV₁/FEVC ratios which also provided the original post-bronchodilator FEV₁ for evaluation of the severity of COPD stages I through IV. These exclusions occurred, because of their PFT study(s) being completed prior to the change over from paper to the AtheanaNet EHR system. Several patients were also excluded due to their mild stage of disease (GOLD I) or post-bronchodilator FEV₁ >80%. After the exclusions were found and a completion of the first random selection for a convenience sample, approximately 102 patients were chosen. Therefore, a second random selection throughout the list was made to find another 18 patients for a total convenience sample goal of 120 patients.

Demographic Description

There were a total of 61 females, or 50.8% of the sample, and 59 males, or 49.2% of the sample. Ethnic differences included 111 Caucasians (92.5%), and eight African Americans (6.7%). One subject's ethnicity was missing from the EHR, making up the remaining 0.8% of the sample. Payer source for this COPD population was also queried for inclusion in this project with 23 patients within the sample having private pay insurance (19.9%). Patients who were in federally funded programs and receiving Medicaid and Medicaid funded programs such as Buckeye, Molina, and Caresource totaled 30 subjects (25%). The rest of the sample patients (54.3%) had Medicare or Medicare supplemental plans as a payer source and only one patient sought treatment as a self-pay patient, representing only 0.8%.

GOLD Related Variables

Out of the 120 convenience sample patients queried, age ranges of these patients were between 40 and 89, with a mean age of 64.83 and a median age of 66 years old. Levels of severity of COPD in this sample ranged from 70 GOLD Stage II patients, which represented 58.3%, 40 GOLD Stage III patients or 33.3%, and 10 GOLD Stage IV patients or 8.3%.

Smoking status was documented on the spreadsheet. A larger number of patients were listed as ex-smokers making up 73 or 61.9% of the sample, and 45 patients were listed as current smokers, making up 38.1% of the sample. However, all 120 patients had documentation of the GOLD recommendations of addressing smoking at every visit, including cessation counseling, and treatment options.

Prescription related GOLD treatment recommendations, specifying use of a short acting broncho-dilator (SABA), were provided to 100% of the sample patients. Prescribed anti-cholinergic inhalers (LAMAs) were provided to 112 patients, for a total of 93.3% receiving this

treatment, and only eight patients did not receive this prescription for a total of 6.7%. Patients who did not receive this treatment did not have a cause listed for why the prescription was not provided. Possible reasons the prescriptions were not provided could include refusal of the prescriptions by the patient, contraindications to the use of LAMA's, and/or cost to obtain and use the prescription.

Other pharmacological GOLD treatment recommendations were the appropriate GOLD stage and symptom use of an inhaled corticosteroid/long acting beta agonist (ICS/LABA) or separate prescriptions of just the ICS or the LABA. The ICS/LABA combination was prescribed by the provider(s) to 111 patients (92.5%), and nine of the sample patients (7.5%), did not receive these prescriptions for unknown reasons previously discussed. A very small number of sample patients were prescribed an ICS alone (15) and only two patients were prescribed a LABA alone.

Both pneumococcal vaccine and influenza vaccines are other recommended GOLD guideline treatments. A total of 65 pneumococcal vaccinated patients make up only 55.1% of the sample, with 53 or 44.9% of sample patients who had not received the recommended injection and/or had their vaccines up to date. Patients who received their yearly influenza vaccine totaled 75 (63.9%), with 43 of the sample patients (36.1%), not receiving or having up to date recommended vaccination(s).

Pulmonary rehabilitation is considered a treatment recommendation by the GOLD guidelines after a patient reaches GOLD Stage II or higher. Sample patients who were prescribed and obtained, or who were currently obtaining pulmonary rehabilitation totaled 44 with a sample percentage of 36.7%, with 75 of the patients (62.5%), not receiving this GOLD treatment recommendation. This DNP student was unable to ascertain whether the younger

and/or less severe, more active patients were performing individual exercise (20 minutes of walking activity every day). Oftentimes, the cost and availability of pulmonary rehabilitation programs are considered to be factors related to enrollment in PR vs. individual exercise.

Finally, the out-patient pulmonary practice providers were able to meet overall GOLD treatment recommendations discussed within this project 80% of the time. Patients who received all of the treatment recommendations represented 20% or 24 of the 120 patients whose EHRs were queried for this project. Patients who had AECOPD in either group were not queried, due to the recommendations from the DNP student's committee members, in order to expedite this EBQI project.

Upon completion of this retrospective data convenience sampling for use of GOLD guidelines treatment recommendations in an out-patient pulmonary practice, several conclusions are evident on the Descriptive Summary for Out-Patient Practice Use of GOLD Guidelines (Table 2).

Table 2: Descriptive Summary for Out-Patient Practice Use of GOLD Guidelines (N=120)

Variable	Response	Frequency	Percent
GOLD Stage	II	70	58.3%
	III	40	33.3%
	IV	10	8.3%
Meets GOLD Smoking Counseling and Treatment at Each Visit	YES	120	100%
Meets GOLD Anticholinergic Treatment for Stage	YES	112	93.3%
	NO	8	6.7%
Meets GOLD ICS/LABA Treatment for Stage	YES	111	92.5%
	NO	9	7.5%
Meets GOLD Flu Vaccination	YES	76	63.3%
	NO	44	36.7%
Meets GOLD Pneumococcal Vaccination	YES	67	55.8%
	NO	53	44.2%
Meets GOLD Pulmonary Rehabilitation	YES	45	37.5%
	NO	75	62.5%
Provider Met GOLD Treatment Recommendations	Partially	96	80.0%
	ALL	24	20.0%

Legend: GOLD=Global obstructive lung disease; ICS/LABA=inhaled corticosteroid/long-acting bronchodilator

Chapter 5: Summary

Discussion

All GOLD stages II, III, and IV patients were prescribed partial or complete use of GOLD guidelines treatment recommendations from several practice providers. All actively smoking patients received smoking cessation counseling at each visit. All current smokers were also offered treatment options and/or prescription therapies for complete cessation.

Greater than 90% of the patients were provided recommended prescription medications, appropriate for their GOLD disease stage. However, it is unknown whether the other 10% of patients were unable to afford medications, refused medications, or had contraindications to its use, due to co-morbidities and/or therapies.

Areas of GOLD guideline treatment discrepancies by the pulmonary providers were a lack of documented and up to date influenza and/or pneumococcal vaccinations. A larger number of patients received influenza vaccinations compared to pneumococcal vaccinations. Although patients were highly encouraged to obtain these vaccinations, ultimately it was up to the patient in our setting to participate in this GOLD treatment recommendation. A possible reason is the lack of access to influenza and or pneumonia vaccines at the pulmonary practice site. Instead, the patients are instructed to seek these vaccines from their primary care provider or an area Pharmacy.

The largest finding on this descriptive summary for GOLD treatment recommendation was the lack of patients who had previous or current pulmonary rehabilitation. Even though GOLD treatment recommendations for pulmonary rehab are for GOLD stage II and higher, some of these GOLD stage II patients may have issues with the cost and a private pay source (copayment), or lack of transportation to the facility. Other conceivable factors that may have

prevented a referral for pulmonary rehabilitation involved those patients with less severe GOLD stage II who were not limited with their daily activity and were able to complete a daily walking routine of greater than 20 minutes to decrease breathlessness. Documentation of opting out of PR referral would clarify rationale for the low PR referral noted in the EHR.

EBQI Project Summary

The overall goal for this EBQI DNP Project was to assess whether COPD GOLD II, III, and IV guidelines treatment recommendations are consistently used by providers in an out-patient pulmonary practice. The descriptive findings provided implications for a future EBP Practice Change within the out-patient pulmonary practice. The Iowa Model provides this guidance and steps for a Practice Change when initial findings within the practice provide sufficient evidence of a gap between theory and practice.

Significance of the Findings

This EBQI Project's findings were able to show that providers overall, were able to achieve an appropriate use of medications (Anti-cholinergic/LAMA, ICS, LAMA, and ICS/LABA) for GOLD stage treatment recommendations. Also, providers within this practice were 100% consistent with GOLD guideline treatment recommendation to address smoking cessation and offer nicotine replacement therapy or other prescriptions to aid in desired cessation. Such interventions were well documented at each visit.

These findings also reveal a lack of consistent use of several of the GOLD treatment recommendations for implementation of pneumococcal vaccinations, influenza vaccinations, and a low incidence of referral for pulmonary rehabilitation by the practice. There is also a lack of documentation in the patient's EHR related to the low vaccination rates but could include patient refusal, contraindications, or cost associated.

Implications for Future Practice Change

The improvement of chronic care management (CCM) of COPD disease within the out-patient care setting has shown improved quality of life and decreased AECOPD (Lemmens et al., 2013, p. 734). Providing and/or improving utilization of GOLD guideline treatment with each guideline every time with every COPD patient would be insured by the use of an out-patient COPD Care Bundle (Table 3).

Table 3: COPD Out-patient Care Bundle:

GOLD (FEV1)___%	AECOPD				
I ___	DATE _____				
II ___	Site _____				
III ___					
IV ___					
Smoking Status	Current ___	Addressed	RX_____	Quit	
	Pack/day___	Yes ___		(year)___	
	Years ___	No ___			
Pharmacologic	LAMA ___	ICS/LABA__	LAMA/LABA___	ICS ___	LABA ___
Pulmonary Rehab	Qualifies ___	Self ___	Referred PR_____		
	Refused ___	(20 minutes daily walking)	Site _____		
		Counseled __			

Care Bundles are identified by the Institute for Health Care Improvement (IHI) to “deliver the best possible care for patients” with three to five Level I Evidence Based Practices (EBP) that are followed together as a group for all patients every time (Haraden, 2014, p. 1). These (CBs) include evidence based actions that are performed consistently, every time, and are proven to improve patient care and outcomes (Haraden, 2014). Therefore, this proposed future EB Practice Change is needed at the out-patient pulmonary practice to improve Level I EBP

compliance for COPD patients to prevent acute exacerbation(s), which decrease COPD patients' quality of life and longevity.

A future EBQI project will include a retrospective data collection for a specific time frame of at least one year since the start of the GOLD guidelines CB creation. The results of the outcomes of the future DNP project would then establish improved outcomes for COPD patients such as appropriate medication use, increased PR referrals, reduction in number of hospitalizations and re-hospitalizations.

The Iowa Model of Evidence-Based Practice to Promote Quality Care (Appendix A), will be utilized for guidance to pilot the change into practice. Additionally, continued quality of care processes, literature query for new knowledge, and disseminating the outcomes and results data will be used to drive care process changes. The outpatient Care Bundle for COPD, once found to be a cost-effective and beneficial Practice Change, can then be disseminated for use in any outpatient practice for use to improve COPD patient diagnosis, treatment, and improved outcomes.

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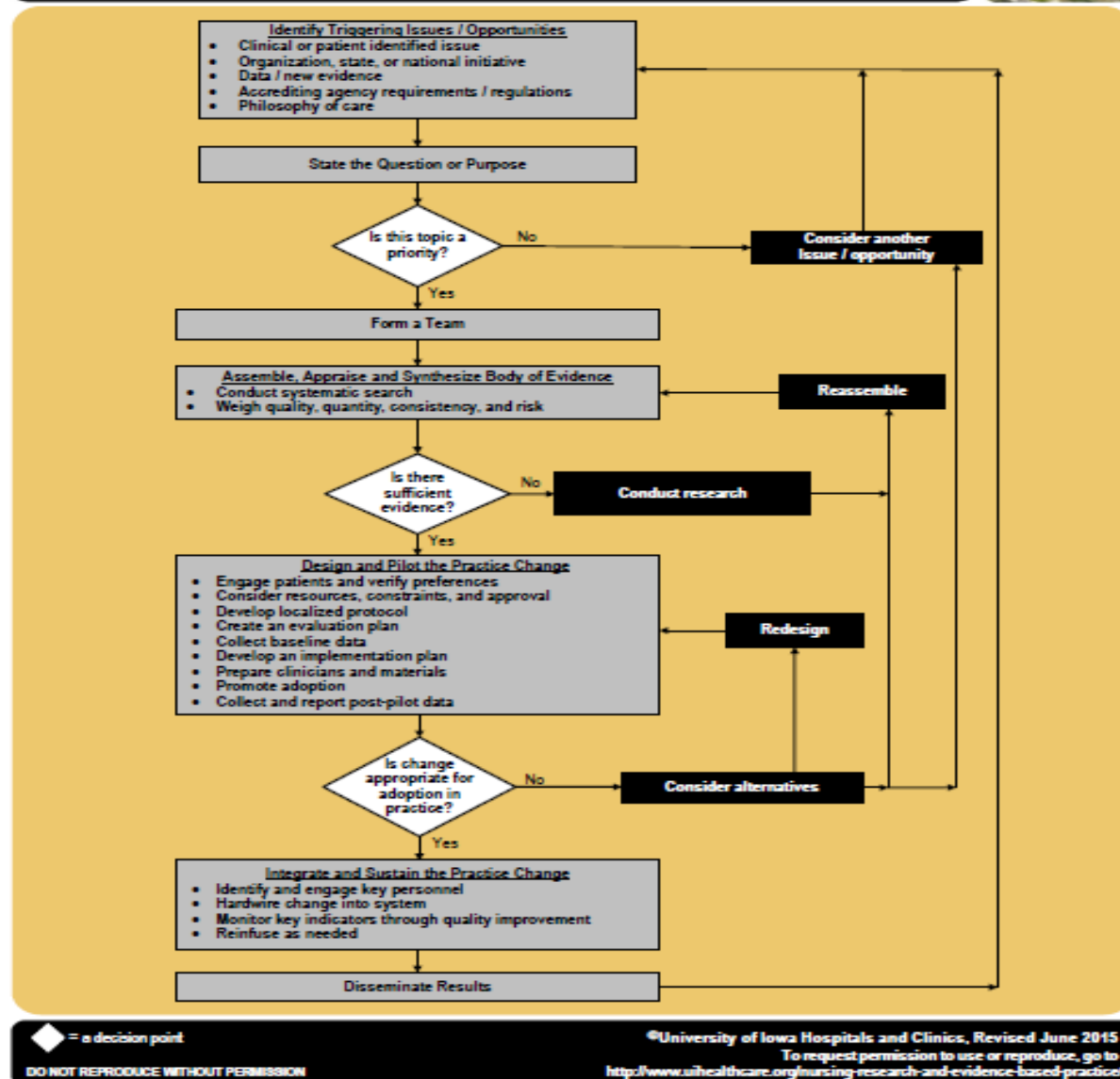
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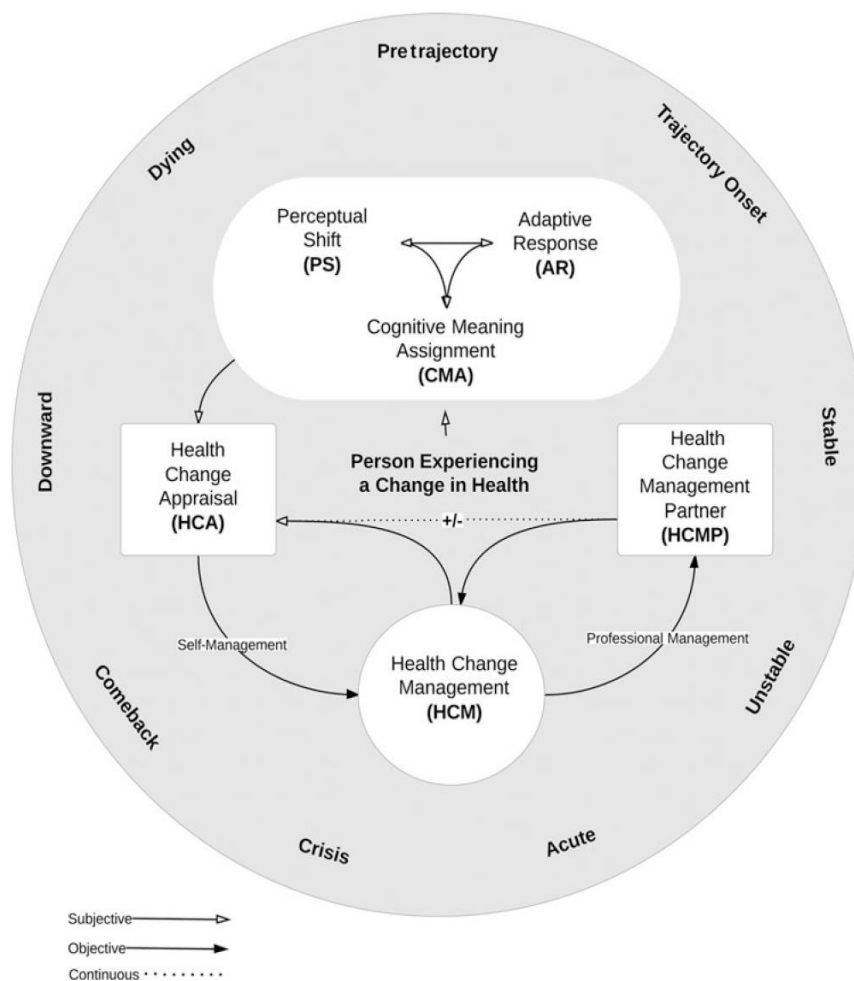
Appendix A: The Iowa Model of Evidence Based Practice to Promote Quality Care

The Iowa Model Revised: Evidence-Based Practice to Promote Excellence in Health Care



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Appendix B: Health Change Trajectory Model



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